

wherein the predetermined light is the second light in the case where the first light is being emitted when the trigger signal is generated, while the predetermined light is the first light in the case where light other than the first light is being emitted when the trigger signal is generated.

111. (amended) An apparatus according to claim 110, wherein the first light is light which is first emitted at the beginning of a sensing operation.

113. (amended) An apparatus according to claim 110, wherein said sequentially emitting first, second and third lights is carried out by operation of a light source control unit which controls a light source such that the first, the second and the third lights are sequentially emitted whereby a sensing unit senses a color image.

114. (amended) An apparatus according to claim 110, wherein the light source control unit controls the light source such that the first, the second and the third lights are sequentially emitted whereby a sensing unit senses a monochrome image.

115. (amended) An apparatus according to claim 110, wherein a sensing unit outputs a signal a plurality of times during the first period.

116. (amended) An apparatus according to claim 110, wherein a sensing unit outputs a signal once during the first period.

REMARKS

Claims 1, 5-8, 14, 18-21, 31-34, 70, 75-76, 78, 83-84, 86, 91-92, 94, 99-100, 102, 105, 108, 110 and 113-116 have all been amended to overcome the informalities noted in paragraph 2 of the Official Action.

In addition, claims 20, 33, 79, 81-84, 87, 89, 90, 103, 105-108, 111 and 113-116 have been amended to overcome the bases for rejection under 35 U.S.C. §112, second paragraph, noted in paragraph 3 of the Official Action. It is submitted that all of the claims now comply with the requirements of Section 112.

Allowed claims 1, 14, 27, 94, 102 and 110 have been amended to substitute "first period" for the phrase "one-line sensing period in which one line of the image is sensed by the sensing unit" and to substitute "second period" for the phrase "non-sensing period". This is because the expressions "a sensing period" and "a non-sensing period" are not necessary in the claims.

Claim 1, for example, specifies that in response to a trigger signal, the sensing unit outputs, in a first period, a signal of one line of an illuminated image. Claim 1 also specifies that the light source control unit causes the lights to be turned on and off in sequence during the first period and then again during a second period (when no signal is output from the sensing unit). Finally, claim 1 specifies that the second period is a period during which no trigger signal is generated over a length of time which is greater than that of the first period. Thus it is sufficient to specify only: (a) that a trigger signal causes a sensing unit to output a signal of one line of an image during a first period; (b) that the lights are turned on and off during this first period; and (c) that the lights are turned on and off again during a second period, where the second period is a period on which no trigger signal occurs and which is longer than the first period.

What is important is that in the intervals between the sensing of successive lines, the lights are turned on and off in the same sequence as during sensing so as to maintain the lights at constant temperature and thereby avoiding light intensity variation which would otherwise occur at the beginning of a restarted image sensing operation. As explained in the previous response filed November 7, 2001, this is not shown in or suggested by the disclosure of Nagano (U. S. Patent No. 4,731,661 or any of the other references.

Claims 7, 8, 14, 20, 21, 27, 33, 34, 94, 99, 100, 102, 107, 108, 110, 115 and 116 have been amended in a manner similar to claim 1 and the above comments apply as well to these claims.

Claims 70-73, 75-81, 83-85, 86-89 and 91-93 are rejected under 35 U.S.C. §102(b) as being anticipated by Nagano.

Claim 70 specifies that the light source control unit causes the light source to emit first, second and third lights in order during a predetermined period, i.e. a period during which a sensing unit outputs a signal of an illuminated image; and, when a trigger signal is generated during emission of the first light, to stop the emission of the first light and to emit a predetermined light, which is the second light.

Nagano's disclosure on the other hand, as noted in the Official Action, involves a different situation, in which a trigger signal (T_D) is generated during a *non-sensing* period, and thereafter the first light (R) is stopped and the second, third and first lights (G), (B) and (R) are sequentially emitted in this order. Thus, Nagano's device does not stop emission of the first light during a period in which an image output signal is produced, nor does it and emit a second light. Instead, when Nagano senses a trigger signal during a non-sensing period he continues to emit the first light (R) in sequence with the second light (G) and the third light (B).

Because of Nagano's failure to disclose the stopping of a first light during a period in which an image output signal is produced, as now claimed in amended claim 70 it is submitted that this claim is novel over Nagano.

Further, it would not have been obvious from Nagano to stop the emission of a first light in response to a trigger signal which is generated while an image output signal is being produced. This is because Nagano is directed to a different problem, namely that of stabilizing the red, green and blue lights before the start of integration of their outputs in order to achieve white balance before a sensing operation takes place.

Accordingly, it is submitted that claim 70 as amended herein patentably distinguishes over Nagano and is allowable.

Claims 71-77 are dependent on claim 70 and patentably distinguish over Nagano for the above reasons.

Regarding claims 78-81 and 83-85, as noted in the Official Action, these are method counterparts of claims 70-73 and 75-77. Accordingly, these claims also patentably distinguish over Nagano for the reasons given above for claims 70-73 and 75-77.

Regarding claim 86, this is the same as claim 78 except that it is directed of a control memory which contains a program for carrying out the method of claim 78. Thus claim 86 contains all of the limitations of claim 78 and patentably distinguishes over Nagano for the reasons given above for claim 78.

Claims 87-93 are dependent on claim 86 and patentably distinguish over Nagano for the reasons given above in regard to claim 86.


Claims 74, 82 and 90 are rejected under 35 U.S.C. §103(a) as being unpatentable over Nagano in view of Lim et al. (U. S. Patent No. 5,532,825).

Claims 74, 82 and 90 are dependent, respectively, on claims 70, 78 and 86 discussed above and which are patentable over Nagano for the reasons given above in regard to claims 70, 78 and 86. The patent to Lim et al. does not add anything to Nagano which makes claims 70, 78 and 86 unpatentable; and in fact Lim et al. was not cited against those independent claims. Because claims 74, 82 and 90 incorporate all of the limitations of claims 70, 78 and 86, respectively, it is submitted that claims 74, 82 and 90 patentably distinguish over Nagano in view of Lim et al. for the same reasons as claims 74, 82 and 90.

It is submitted that, in view of the foregoing, all of the claims of this application as now amended patentably distinguish over the references and are allowable. Further consideration by the examiner and allowance of this application is respectfully requested.

Applicants' undersigned attorney may be reached in our New York office by telephone at (212) 218-2100. All correspondence should continue to be directed to our below listed address.

Respectfully submitted,


William J. Brunet
Attorney for Applicants
Registration No. 20452

FITZPATRICK, CELLA, HARPER & SCINTO
30 Rockefeller Plaza
New York, New York 10112-3801
Facsimile: (212) 218-2200

VERSION WITH MARKINGS TO SHOW CHANGES TO CLAIMS

1. (three times amended) An image sensing apparatus comprising:

(a) first, second and third light sources which emit light which are different in wavelength;

(b) a signal generator unit which generates a trigger signal for triggering an operation of sensing one line of one image;

(c) a sensing unit which, in response to the trigger signal, outputs in a first period, a signal of one line of the image illuminated by the light source; and

(d) a light source control unit which controls such that, in a first period, the first, the second, and the third light sources are sequentially turned on and off in this order[in a one-line sensing period in which one line of the image is sensed by the sensing unit] and such that, in a second[non-sensing] period[in which no image sensing operation is performed], the first, the second, and the third light sources are sequentially turned on and off[by the light source control unit] in this order before a next trigger signal is generated, wherein the second[non-sensing] period is such a period during which no trigger signal is generated over a length of time greater than the length of time of the first[a one-line sensing] period.

5. (amended) An apparatus according to claim 1[4], wherein said light source control unit[controlling means] sequentially turns on the first, the second and the third[said plurality of] light sources so that said[image] sensing unit[means] may sense an image in a color mode.

6. (amended) An apparatus according to claim 1[4], wherein said light source control unit[controlling means] sequentially turns on the first, the second and the third[said plurality of] light source[sources] so that said[image] sensing unit[means] may sense an image in a monochrome mode.

7. (twice amended) An apparatus according to claim 1, wherein said sensing unit outputs a signal a plurality of times during [a]the first[one-line sensing] period.

8. (twice amended) An apparatus according to claim 7, wherein said sensing unit outputs a signal once during [a]the first[one-line sensing] period.

14. (three times amended) A method of sensing an image, comprising the steps of:

(a) emitting light which is different in wavelength from first, second, and third light sources;

(b) generating a trigger signal for triggering an operation of sensing one line of an image;

(c) in response to the trigger signal, outputting in a first period, one line of the image illuminated with the emitted light; and

(d) in addition to sequentially turning on and off the first, the second, and the third light sources in this order in the first period[a one-line sensing period], turning on and off the first, the second, and the third light sources in this order in a second[non-sensing] period before a next trigger signal is generated, wherein the second[non-sensing] period is such a period during which no trigger signal is generated over a length of time greater than the length of time of the [a] one-line sensing period.

18. (amended) A method of sensing an image according to claim 14[17], wherein the first, the second and the third[said plurality of] light sources are sequentially turned on thereby sensing an image in a color mode.

19. (amended) A method of sensing an image according to claim 14[17], wherein the first, the second and the third[said plurality of] light sources are sequentially turned on thereby sensing an image in a monochrome mode.

20. (twice amended) A method of sensing an image according to claim 14, wherein the operation of sensing produces[sensing unit outputs] a signal a plurality of times during [a]the first[one-line sensing] period.

21. (twice amended) A method of sensing an image according to claim 20, wherein said sensing unit outputs a signal once during [a]the first[one-line] sensing period.

27. (three times amended) A control memory in which is stored a program comprising the steps of:

(a) emitting light which is different in wavelength from first, second, and third light sources;

(b) generating a trigger signal for triggering an operation of sensing one line of an image;

(c) in response to the trigger signal, outputting, in a first period, one line of the image illuminated with the emitted light; and

(d) in addition to sequentially turning on and off the first, the second, and the third light sources in this order from in the first[a one-line sensing] period, turning on and off the first, the second, and the third light sources in this order in a second[non-sensing] period before a next trigger signal is generated, wherein the second[non-sensing] period is such a period during which no trigger signal is generated over a length of time greater than the length of time of the first[a one-line sensing] period.

31. (amended) A control memory according to claim 27[30], wherein said program sequentially turns on the first, the second and the third[said plurality of] light sources for sensing an image in a color mode.

32. (amended) A control memory according to claim 27[30], wherein said program sequentially turns on the first, the second and the third[said plurality of] light sources for sensing an image in a monochrome mode.

33. (twice amended) A control memory according to claim 27, wherein said operation of sensing produces an [program causes the sensing unit to] output a signal a plurality of times during [a] the first [one-line sensing] period.

34. (twice amended) A control memory according to claim 33, wherein said program causes said sensing unit to output a signal once during [a] the first [one-line sensing] period.

70. (amended) An image sensing apparatus comprising:

(a) a light source which emits first light, second light, and third light which are different in wavelength;

(b) a signal generator unit which generates a trigger signal for triggering an operation of sensing one line of an image;

(c) a sensing unit which, in response to the trigger signal, outputs, in a predetermined period, a signal of one line of the image illuminated by the light source; and

(d) a light source control unit which controls to emit said first, second and [the light source such that the first light, the second light, and the] third light [are sequentially emitted] in [this] order in a predetermined order during the predetermined [one-line sensing] period [in which one line of the image is sensed] by the sensing unit and controls to stop [such that if a trigger signal is generated in a non-sensing period,] emission of the first light [is stopped] and to emit a predetermined light of said light source when said trigger signal is generated during emission of said first light [the second light, the third light, and the first light are sequentially emitted in this order, wherein the non-sensing period is such a period, in a one-line sensing period, during which only the first light is emitted]

wherein said predetermined order is the order of first, second and third light, and said predetermined light is the second light.

75. (amended) An apparatus according to claim 70, wherein said sensing unit outputs a signal a plurality of times during [a] the predetermined [one-line sensing] period.

76. (amended) An apparatus according to claim 70, wherein the sensing unit outputs a signal once during [a]the predetermined[one-line sensing] period.
78. (amended) A method of sensing an image, comprising the steps of:
- (a) generating a trigger signal for triggering an operation of sensing one line of an image;
 - (b) sequentially emitting first, second, and third light in a predetermined first[one-line sensing] period,
 - (c) in response to the trigger signal, outputting one line of the image illuminated with the emitted light; and
 - (d) in addition to sequentially emitting the first, second and third light in the one-line sensing period, if a trigger signal is generated in a second[non-sensing] period, stopping emission of the first light, and sequentially emitting the second light, the third light, and the first light in this order, wherein said second[the non-sensing] period is such a period, in the predetermined first[a one-line sensing] period, during which only the first light is emitted.
79. (amended) A method [An apparatus] according to claim 78, wherein the first light is light which is first emitted at the beginning of a sensing operation[performed by the sensing unit].
80. (amended) A method [An apparatus] according to claim 78, wherein the first light is light which is slower in a rising speed when being turned on than the second and third light.
81. (amended) A method [An apparatus] according to claim 78, wherein said sequentially emitting first, second and third lights is carried out by controlling a[the light source control unit controls the] light source such that a[the] plurality of light rays are sequentially emitted whereby a[the] sensing unit senses a color image.

82. (amended) A method [An apparatus] according to claim 78, wherein said sequentially emitting first, second and third light is carried out by controlling a[the] light source control unit controls the light source such that a[the] plurality of light rays are sequentially emitted whereby a[the] sensing unit senses a monochrome image.
83. (amended) A method [An apparatus] according to claim 78, wherein a[the] sensing unit outputs a signal a plurality of times during [a]the predetermined[one-line sensing] period;
84. (amended) A method [An apparatus] according to claim 78, wherein a[the] sensing unit outputs a signal once during [a]the predetermined[one-line] sensing period;
85. (amended) A method [An apparatus] according to claim 78, wherein the first light, the second light, and the third light are each one of red light, green light, and blue light.
86. (amended) A control memory in which is stored a program comprising the steps of:
- (a) generating a trigger signal for triggering an operation of sensing one line of an image;
 - (b) sequentially emitting first, second, and third light in a predetermined first[one-line sensing] period,
 - (c) in response to the trigger signal, outputting one line of the image illuminated with the emitted light; and
 - (d) in addition to sequentially emitting the first, second and third light in said predetermined first[the one-line sensing] period, if a trigger signal is generated in a second[non-sensing] period, stopping emission of the first light, and sequentially emitting the second light, the third light, and the first light in this order, wherein said second[the non-sensing] period is such a period, in the predetermined first[a one-line sensing] period, during which only the first light is emitted.

87. (amended) A control memory [An apparatus] according to claim 86, wherein the first light is light which is first emitted at the beginning of a sensing operation[performed by the sensing unit].
88. (amended) A control memory [An apparatus] according to claim 86, wherein the first light is light which is slower in a rising speed when being turned on than the second and third light.
89. (amended) A control memory [An apparatus] according to claim 86, wherein said sequentially emitting first, second and third lights is carried out by operation of a[the] light source control unit which controls a[the] light source such that the plurality of light rays are sequentially emitted whereby a[the] sensing unit senses a color image.
90. (amended) A control memory [An apparatus] according to claim 86, wherein said sequentially emitting first, second and third lights is carried out by operation of a[the] light source control unit which controls a[the] light source such that the plurality of light rays are sequentially emitted whereby a[the] sensing unit senses a monochrome image.
91. (amended) A control memory [An apparatus] according to claim 86, wherein the sensing unit outputs a signal a plurality of times during [a]the predetermined[one-line sensing] period[;].
92. (amended) A control memory [An apparatus] according to claim 86, wherein the sensing unit outputs a signal once during [a]the predetermined[one-line sensing] period[;].
93. (amended) A control memory [An apparatus] according to claim 86, wherein the first light, the second light, and the third light are each one of red light, green light, and blue light.

94. (amended) An image sensing apparatus comprising:

(a) a light source which emits first light, second light, and third light which are different in wavelength;

(b) a signal generator unit which generates a trigger signal for triggering an operation of sensing one line of an image;

(c) a sensing unit which, in response to the trigger signal, outputs a signal of one line of the image illuminated by the light source; and

(d) a light source control unit which controls the light source such that the first light, the second light, and the third light are sequentially emitted in this order in the first[to a one-line sensing] period in which one line of the image is sensed by the sensing unit and such that predetermined light is emitted when the[a] trigger signal is generated in a second[non-sensing] period, wherein the second[non-sensing] period is such a period during which no trigger signal is generated over a length of time greater than the length of time of a first[one-line sensing] period, and wherein the predetermined light is the second light in the case where the first light is being emitted when the trigger signal is generated, while the predetermined light is the first light in the case where light other than the first light is being emitted when the trigger signal is generated.

99. (amended) An apparatus according to claim 94, wherein the sensing unit outputs a signal a plurality of times during [a]the first[one-line sensing] period[;].

100. (amended) An apparatus according to claim 94, wherein the sensing unit outputs a signal once during [a]the first[one-line sensing] period[;].

102. (amended) A method of sensing an image, comprising the steps of:

- (a) generating a trigger signal for triggering an operation of sensing one line of an image;
- (b) sequentially emitting first, second, and third light in a one-line sensing period,
- (c) in response to the trigger signal, outputting one line of the image illuminated with the emitted light; and
- (d) in addition to sequentially emitting the first, second and third light in the one-line sensing period, emitting predetermined light when the [a] trigger signal is generated in a non-sensing period, wherein the non-sensing period is such a period during which no trigger signal is generated over a length of time greater than the length of time of the [a] one-line sensing period, and wherein the predetermined light is the second light in the case where the first light is being emitted when the trigger signal is generated, while the predetermined light is the first light in the case where light other than the first light is being emitted when the trigger signal is generated..

103. (amended) An apparatus according to claim 102, wherein the first light is light which is first emitted at the beginning of a sensing operation[performed by the sensing unit].

105. (amended) An apparatus according to claim 102, wherein said sequentially emitting first, second and third lights is carried out by a [the] light source control unit which controls a [the] light source such that the first, the second and the third lights [plurality of light rays] are sequentially emitted whereby a [the] sensing unit senses a color image.

106. (amended) An apparatus according to claim 102, wherein said sequentially emitting first, second and third lights is carried out by operation of a [the] light source control unit which controls a [the] light source such that the first, the second and the third lights [plurality of light rays] are sequentially emitted whereby a [the] sensing unit senses a monochrome image.

107. (amended) An apparatus according to claim 102, wherein a [the] sensing unit outputs a signal a plurality of times during [a]the first [one-line sensing] period[;].

108. (new) An apparatus according to claim 102, wherein a[the] sensing unit outputs a signal once during [a]the first[one-line sensing] period[;].

110. (amended) A control memory in which is stored a program comprising the steps of:

- (a) generating a trigger signal for triggering an operation of sensing one line of an image;
- (b) sequentially emitting first, second, and third light in a one-line sensing period,
- (c) in response to the trigger signal, outputting, in a first period, one line of the image illuminated with the emitted light; and
- (d) in addition to sequentially emitting the first, second and third light in the first[one-line sensing] period, emitting predetermined light when the[a] trigger signal is generated in a second[non-sensing] period,

wherein the non-sensing period is such a period during which no trigger signal is generated over a length of time greater than the length of time of said first[a one-line sensing] period, and

wherein the predetermined light is the second light in the case where the first light is being emitted when the trigger signal is generated, while the predetermined light is the first light in the case where light other than the first light is being emitted when the trigger signal is generated.

111. (amended) An apparatus according to claim 110, wherein the first light is light which is first emitted at the beginning of a sensing operation[performed by the sensing unit].

113. (amended) An apparatus according to claim 110, wherein said sequentially emitting first, second and third lights is carried out by operation of a[the] light source control unit which controls a[the] light source such that the first, the second and the third lights[plurality of light rays] are sequentially emitted whereby a[the] sensing unit senses a color image.

114. (amended) An apparatus according to claim 110, wherein the light source control unit controls the light source such that the first, the second and the third lights[plurality of light rays] are sequentially emitted whereby a[the] sensing unit senses a monochrome image.

115. (amended) An apparatus according to claim 110, wherein a[the] sensing unit outputs a signal a plurality of times during [a]the first[one-line sensing] period[;].

116. (amended) An apparatus according to claim 110, wherein a[the] sensing unit outputs a signal once during [a]the first[one-line sensing] period[;].

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